

BOOK REVIEWS

APPLICATION OF GEOGRAPHIC INFORMATION SYSTEMS IN HYDROLOGY AND WATER RESOURCES MANAGEMENT edited by K. Kovar and H. P. Nachtnebel, International Association of Hydrological Sciences, Publication No. 211, IAHS Press, Wallingford, 1993. No. of pages: ix + 693. Price: £53.34 (\$80). ISBN 0-947571-48-5.

This volume is yet another state-of-the-art, 'hot off the press', IAHS publication. The quality of reproduction and presentation is excellent, an important requirement given that GIS is visually stimulating and colourful by its very nature. I can see this text being of interest to a wide variety of readers; in particular, it will be of use to research students and other researchers new to GIS. The book gives readers the chance to peruse the options and choose which GIS strategy will best suit their needs. The papers explore a wide range of issues with different goals, scales and problems. For any hydrologist or water resources manager, a quick look through the book should bring them up to date with recent GIS advances; in fact, perhaps the book could even occupy a place on the reference shelves.

The book contains eight sections, with GIS described in relation to the following issues: decision support and expert systems; remote sensing; digital terrain analysis; GIS in three and four dimensions; hydrological models; water and environmental health; surface water systems; and finally, applications to groundwater systems. These headings reflect the range of the papers within the

book, but few of the papers truly fit into only one section; the overlap of emphasis among the papers means that they could easily fit into any section. Hence, readers are advised to check through the whole book in order to find the papers relevant to their own interest. The papers, in general, give a good insight into the software and hardware options used, and most papers have a useful reference list.

However, there are certain reservations that must be mentioned. The first is that a number of the papers are too short, and indeed some are so brief that there is no real substance to them. Certain of the papers have an air of rather slick salesmanship, which personally I find detracts from the scientific quality of the volume. There is also a general criticism of GIS to be made, and this can be applied to this compilation. The criticism is perfectly expressed in the paper by Grayson *et al.* on page 83 of this volume:

The sophisticated graphics and data handling features of GIS can be used to seduce the user into an unrealistic sense of model accuracy.

This book is therefore a good guide to up-to-date GIS usage in hydrology and water resources, but it is not a GIS bible and the reader should maintain a critical eye.

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SEDIMENT PROBLEMS: STRATEGIES FOR MONITORING, PREDICTION AND CONTROL edited by R. F. Hadley and T. Mizuyama, International Association of Hydrological Sciences, Publication No. 217, IAHS Press, Wallingford, 1993. No. of pages: viii + 284. Price: £40.00. ISBN 0-947571-78-7.

Well over 200 of the famous IAHS 'red books' have now appeared, the first in 1924, and around eight new ones emerge each year. The instructions for editors of IAHS proceedings include a gentle forewarning that symposium papers may, on average, be of a lower standard than those accepted by journals, yet this particular contribution from the IAHS International Commission on Continental Erosion (ICCE) has much to offer. The

volume—the proceedings of the July 1993 conference in Yokohama—contains 31 papers grouped into six sections: 1. Erosion and Sediment Yield; 2. Landslides and Pyroclastic Flows; 3. Deposition Processes in Reservoirs; 4. Modelling and Monitoring of Sedimentation and Erosion Processes; 5. Soil Erosion, Sediment Losses and Drainage Basin Characteristics; 6. Monitoring Processes of Erosion and Sediment Transport.

A number of highlights emerged for this reviewer. The volume opens with a neat comparison by Simanton *et al.* of three methods of monitoring channel sediment transport in semiarid Arizona. In Section 2, Onda shows clearly the importance of hillslope hydrological processes, rather than regolith shear strength, in controlling the occurrence of shallow landslides in central Japan. Recent changes in catchment erosion and reservoir

deposition rates are handled sensitively for a New South Wales basin by Srikanthan and Wasson (Section 3). They suggest that post-1950 declines in sedimentation rate reflected equilibration of the upstream drainage network following incision soon after European settlement. 'Recent changes' is a theme which will be returned to in the IAHS ICCE volumes for Canberra (December 1994) and Exeter (July 1996). Through a combination of SHE model simulations and simultaneous measurements of sediment transport and hillslope erosion rates in the Syv Brook catchment, Denmark, Hasholt and Styczen (Section 4) demonstrate the significance of groundwater levels in the relative dominance of soil erosion components. In the same section, Ritchie *et al.* present a useful-looking airborne laser technique with a vertical accuracy of 0.05 m for the rapid surveying of channel cross-sections. A detailed investigation into soil erosion and controls in Zimbabwe using ^{137}Cs is reported by Quine *et al.* in Section 5. Banzal and Hayase (Section 6) describe some nice experimental results from a special type of lysimeter and derive a new soil loss equation for sandy and volcanic ash materials. As a final example, Rose *et al.*, also in Section 6, set out an interesting theoretical basis for discriminating between mass movement and rainfall detachment/overland flow processes on hillslopes.

There are other strengths. The volume acts as a useful showcase for recent Japanese research on hillslope instability and erosion processes (15 papers), which should help to balance the explosion of work from that country on channel hydraulics and river engineering. Environmental representation is good, and papers on tropical, subtropical, arid, semi-arid, humid temperate and cold regions can be found. Several new techniques are paraded. Furthermore, a wealth of soil erosion data, from plot to catchment scale, is made available through its pages. Finally, there is a refreshingly strong focus on slope processes, and particularly hillslope hydrology, in explanations and predictions of sediment yield.

However, my feeling is that this volume lacks something of the coherence and sparkle of other IAHS 'sediment' volumes (e.g. Bordas and Walling, 1988; Hadley and Ongley, 1989; Bogen *et al.*, 1992). Its great breadth works against the emergence of unifying themes or detailed research agenda. There are only two

internationally collaborative efforts represented, very few interdisciplinary contributions, and too many papers betray a lack of awareness of advances elsewhere and display a rather parochial approach to reference citation. Potentially useful datasets are presented but, occasionally, data collection methods are so briefly described as to inhibit meaningful interpretation of results; this is especially curious given the methodological flavour implied by the volume subtitle and preface. Moreover, few contributions attempt to quantify error and uncertainty or volunteer a clear and concise statement of conclusions. Furthermore, despite IAHS advice to authors, too many submissions fail to include principal conclusions in the abstract, and this may frustrate future searches of bibliographic databases (and potential users of the full paper!).

Nevertheless, the timetable for prepublished proceedings is extremely tight, and the editors should be thanked for convening the Yokohama conference, screening the contributions, and welding a somewhat disparate collection of papers into a finished volume. Despite the reservations noted above, this volume could point the way to much-needed future collaboration between those with slope process expertise—especially geotechnical, geomorphological and hydrological research groups—and channel dynamics specialists. There is much in IAHS Publication No. 217 to suggest that linking hillslope to channel more explicitly would yield substantial advances in understanding, monitoring and managing sediment problems.

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- Bogen, J., Walling, D.E. and Day, T. J. (Eds). 1992. *Erosion and Sediment Transport Monitoring Programmes in River Basins, Proceedings of Oslo Symposium, August 1992*, IAHS Publication No. 210, 538 pp.
- Bordas, M. P. and Walling, D. E. (Eds). 1988. *Sediment Budgets, Proceedings of Porto Alegre Symposium, December 1988*, IAHS Publication No. 174, 591 pp.
- Hadley, R. F. and Ongley, E. D. (Eds). 1989. *Sediment and the Environment, Proceedings of Baltimore Symposium, May 1989*, IAHS Publication No. 184, 218 pp.

PHYSICAL ADJUSTMENTS IN A CHANGING LANDSCAPE: THE SINGAPORE STORY edited by A. Gupta and J. Pitts, Singapore University Press, Singapore, 1992. No. of pages: xviii + 423. Price: US \$32.00. ISBN 9971-69-172-8.

Analysis of the urban environment embraces the physical

situation of a city, the modifications of that environment by urban activity, and the hazards and problems that arise from such modifications. All three aspects are remarkably well dealt with in this excellent study of the physical geography of Singapore, which is also a noteworthy contribution to tropical geomorphology. One hundred and eight pages are devoted to the geology and geomorphic evolution of Singapore, and a further